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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,971	11/14/2001	Koichi Tanaka	09792909-5272	6785

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SONNENSCHEIN NATH & ROSENTHAL LLP
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER	
RUTHKOSKY, MARK	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 09/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/992,971	TANAKA, KOICHI	
	Examiner	Art Unit	
	Mark Ruthkosky	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14 and 29-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 29-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/10/2006 has been entered.

Claim Rejections - 35 USC § 112

The rejection of claims 1-11 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been overcome by applicant's amendment canceling the claimed subject matter.

The rejection of claims 1-11 under 35 U.S.C. 112, first paragraph, for failing to comply with the enablement requirement has been overcome by applicant's amendment canceling the claimed subject matter.

Claim Rejections - 35 USC § 102

The rejection of claims 15-28 under 35 U.S.C. 102(b) as being anticipated by Kelley et al. (US 6,080,501) has been overcome by applicant's amendment canceling claims 15-28.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

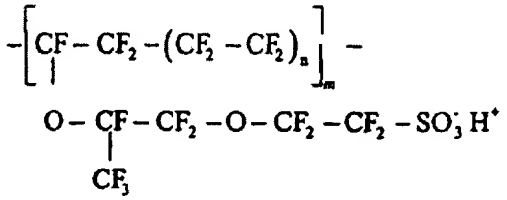
> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-14 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley et al. (US 6,080,501), and further in view of Bass et al. (US 6,001,500.)

The instant claims are to an electrochemical device comprising a fuel electrode which becomes a negative electrode while accompanying the generation of hydrogen; an oxygen electrode provided in contact with oxygen which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons; an ion-exchange membrane for conducting the hydrogen ions in the fuel electrode into the oxygen electrode, the ion-exchange membrane having a proton conductor comprising a polymer material; and a fuel source for supplying a fuel so as to generate the hydrogen ions in the fuel electrode; the fuel electrode and the fuel source constitute a fuel electrode assembly in a state being in contact with each other, and said fuel source being surrounded by said fuel electrode; the fuel electrode assembly is surrounded by the ion-exchange membrane in a state being in contact with the ion exchange membrane; and the ion-exchange membrane is surrounded by the oxygen electrode in a state being in contact with the oxygen electrode. The ion exchange membrane further comprises a carbon cluster derivative including a plurality of functional

groups capable of transferring a plurality of protons between each of the functional groups of the carbon cluster derivative.

Kelley et al. (US 6,080,501) teaches an electrochemical device comprising a fuel electrode which becomes a negative electrode while accompanying the generation of hydrogen; an oxygen electrode provided in contact with oxygen which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons; an ion-exchange membrane for conducting the hydrogen ions in the fuel electrode into the oxygen electrode, the ion-exchange membrane having a proton conductor; and a fuel source for supplying a fuel so as to generate the hydrogen ions in the fuel electrode; wherein the fuel electrode and the fuel source constitute a fuel electrode assembly in a state being in contact with each other. The anode and cathode are composed of a conductive cloth or fiber paper coated with a noble metal such as platinum (col. 3, lines 25-50.) The proton conductor is a solid polymer electrolyte material that is ion-permeable. The material includes a porous portion and inorganic, sulfur ionic groups attached to the membrane to transfer charge. The ion exchange membrane is a polystyrene polymer substituted with perfluorinated sulfonic acid groups, inorganic polymers and Nafion (col. 3, lines 35-50.) These materials comprise a carbon cluster polymer derivative including a plurality of SO_3H groups that transfer protons between the functional groups of the carbon cluster derivative.



Nafion

The fuel source includes metal hydride materials, carbon nanofibers and carbon nanotubes (col. 4, lines 1-45.) The materials are contained in a housing and are electrically connected through the inter medium (col. 4, lines 30-60.) The housing has oxidant passages for electrode reactivity (figures.)

The reference does not teach a fuel electrode assembly surrounded by the ion-exchange membrane in a state being in contact with the ion exchange membrane and the ion-exchange membrane surrounded by the oxygen electrode in a state being in contact with the oxygen electrode. Bass et al. (US 6,001,500), however, teaches an electrochemical device comprising a fuel electrode which becomes a negative electrode while accompanying the generation of hydrogen; an oxygen electrode provided in contact with oxygen which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons; an ion-exchange membrane for conducting the hydrogen ions in the fuel electrode into the oxygen electrode, the ion-exchange membrane having a proton conductor; and a fuel source for supplying a fuel so as to generate the hydrogen ions in the fuel electrode. The fuel electrode assembly surrounded by the ion-exchange membrane in a state being in contact with the ion exchange membrane and the ion-exchange membrane surrounded by the oxygen electrode in a state being in contact with the oxygen electrode. The fuel electrode includes a carbon particle supported platinum catalyst layer (col. 2, line40- col. 3, line 60.) The hydrogen gas fuel source is fed through the carbon rod to contact the catalyst on the interior of the cylindrical fuel cell (see col. 7, line 55 to col. 8, line 15.) The fuel source is surrounded by the fuel electrode in a state of being in contact with the fuel electrode. The catalyst includes a proton

conductor in the layer. Nafion is taught as a proton conductor with proton dissociative groups in a carbonaceous material containing carbon as a main component.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a fuel cell comprising an electrode structure with the anode on the inner surface of a cylinder and the cathode on the outer surface of the cylinder, as taught in Bass, in a fuel cell as taught by Kelley, as this configuration will allow for an equivalent means of catalyzing the fuel and oxidant reactions in a fuel cell and providing electrical current from the fuel cell. Further, it would be obvious to one of ordinary skill in the art to incorporate the fuel source material taught in Kelley on the interior of the cylindrical fuel cell when the anode is on the inner surface of the cylinder in order for the fuel cell reactions to take place as described in Kelley. As the anode requires the fuel source, one of ordinary skill in the art would be motivated to include the fuel source on the inner surface of the fuel cell electrode configuration taught in Bass in order to react the fuel at the anode. The cited references clearly show that the fuel cell electrode assembly may include the anode or cathode on the interior or outer surface. The order of the anode and cathode taught in Bass would provide the equivalent fuel cell as taught in Kelley and one of ordinary skill in the art would recognize that the order of the electrodes would be coupled with the appropriate reactant for the electrode.

With regard to claim 5, the reference does not teach the fuel source formed into a round column. In Kelley, the fuel source surrounds the anode for direct contact between the two. As noted in the rejection, it would be obvious to one of ordinary skill in the art at the time the invention was made to use an electrode structure with the anode on the inner surface of the cylinder, as taught in Bass, and the cathode on the outer surface of the cylinder as taught in Bass

in order to achieve the equivalent reaction as taught in Kelley. As the anode, by definition, requires the fuel source to contact the anode for catalysis of the fuel cell reactions, one of ordinary skill in the art would be motivate to include the fuel source on the inner surface of the fuel cell in order to react the fuel at the anode. In both references, the shape of the inner surface is cylindrical and therefore the shape of the fuel source on the interior when the anode is on the interior of the cylinder would be a round column shape.

With regard to the claims, MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." The material includes carbon chains in the membrane.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley et al. (US 6,080,501), in view of Bass et al. (US 6,001,500,) as presented in the previous section, and further in view of Hinokuma et al. (US 6,495,290.)

The teachings of Kelley et al. (US 6,080,501) and Bass et al. (US 6,001,500) have been presented. With regard to the fuel cell catalyst, the fuel electrode includes a carbon particle supported platinum catalyst layer (Bass, col. 2, line40- col. 3, line 60.) The catalyst includes a proton conductor in the layer. Nafion is taught as a proton conductor with proton dissociative groups in a carbonaceous material containing carbon as a main component. Neither Kelley et al. (US 6,080,501) nor Bass et al. (US 6,001,500) teach that the proton conductor comprises a

fullerene derivative. Hinokuma et al. (US 6,495,290), however, teaches a fullerene derivative as a proton conductor in fuel cells with proton dissociative groups in a carbonaceous material containing carbon as a main component. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the fullerene derivative of Hinokuma as the proton conductor in the Kelley et al. and Bass fuel cells as Hinokuma teaches that the fullerene proton conductor achieves an electrochemical device having increased thermal, increased strength and chemical stability while permitting the conduction of protons as taught in the fuel cells of the cited references (abstract, for example.) The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Response to Arguments

Applicant's arguments filed 6/19/2006 have been fully considered but they are not persuasive. Applicant argues that the references do not teach a fuel cell wherein the fuel source is surrounded by the fuel electrode in a state of being in contact with the fuel electrode. This is not accurate. In Bass, the hydrogen gas fuel source is fed through the carbon rod to contact the catalyst on the interior of the cylindrical fuel cell (see col. 7, line 55 to col. 8, line 15.) The fuel source is surrounded by the fuel electrode in a state of being in contact with the fuel electrode. Further, it is noted that when the alternative configuration taught in Bass is used, one of ordinary skill in the art would be motivated by the teachings of Kelley to include the solid hydrogen storage material fuel source on the anode side of the cylinder in order for the fuel cell reactions to occur. When the anode is on the interior of the cylinder, the fuel source would be required on the interior of the cylinder for the fuel cell to function. As for the structure of Bass described in

the arguments by the applicant, applicant omits the discussion of the fuel source and only describes the electrode structure. It is clear that fuel flows across the anode for catalytic fuel cell reactions to produce electricity.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Kelley clearly shows a fuel source in contact with the anode of a cylindrical fuel cell. Thus, as noted in the rejection, based on the teachings of Kelley and Bass, one of ordinary skill in the art would be motivated to include the fuel source in contact with the anode of the cylindrical fuel cell when the structure of Kelley is used with the anode on the interior of the cylinder.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745

Mark Ruthkosky
9/3/06